User's Manual

E2 Emulator Lite RTE0T0002LKCE00000R
User's Manual

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(2012.4)

Preface

The E2 Emulator Lite (RTE0T0002LKCE00000R) is designed for use with the MCU's made by Renesas Electronics. In this document, we describe 'E2 Emulator Lite' as 'E2 lite'.

All components of the E2 Lite are listed under "1.1 Package Components". If you have any questions about the E2 Lite, contact your local distributor.

Documentation for the E2 Emulator Lite manual is in two parts: the E2 Emulator Lite User's Manual (this manual) and the E1/E20 Emulator, E2 Emulator Lite Additional Document for the User's Manual. Different versions of the latter correspond to different sets of MCUs. In using the E2 Lite, please be sure to read each user's manual.

This user's manual describes mainly the hardware specifications of the E2 Lite. For information on emulator debuggers and other related products, please see the additional document for user's manuals included with each product.
You can download the latest manuals from the Renesas Tools homepage.

http://www.renesas.com/e2lite

Important

Before using the emulator, be sure to read this user’s manual carefully.
Keep this user’s manual, and refer to it when you have questions about the emulator.

Emulator:

"Emulator" in this user’s manual collectively refers to the E2 Lite manufactured by Renesas Electronics Corporation.
"Emulator" herein encompasses neither the customer's user system nor the Host machine.

Purpose of use of the emulator:

This emulator is a device to support the development of systems that uses the Renesas microcomputers. It provides support for system development in both software and hardware. By using in combination with a programming software, it is available as a Flash programming tool.
Be sure to use the emulator correctly according to said purpose of use. Please avoid using the emulator other than for its intended purpose of use.

For those who use the emulator:

The emulator can only be used by those who have carefully read the user’s manual and know how to use it.
Use of the emulator requires basic knowledge of electric circuits, logical circuits, and MCUs.

When using the emulator:

(1) The emulator is a development-support unit for use in your program development and evaluation stages. When a program you have finished developing is to be incorporated in a mass-produced product, the judgment as to whether it can be put to practical use is entirely your own responsibility, and should be based on evaluation of the device on which it is installed and other experiments.
(2) In no event shall Renesas Electronics Corporation be liable for any consequence arising from the use of the emulator.
(3) Renesas Electronics Corporation strives to provide workarounds for and correct trouble with products malfunctions, with some free and some incurring charges. However, this does not necessarily mean that Renesas Electronics Corporation guarantees the provision of a workaround or correction under any circumstances.
(4) The emulator covered by this document has been developed on the assumption that it will be used for program development and evaluation in laboratories. Therefore, it does not fall within the scope of applicability of the Electrical Appliance and Material Safety Law and protection against electromagnetic interference when used in Japan.
(5) Renesas Electronics Corporation cannot predict all possible situations and possible cases of misuse that carry a potential for danger. Therefore, the warnings in this user's manual and the warning labels attached to the emulator do not necessarily cover all such possible situations and cases. The customer is responsible for correctly and safely using the emulator.
(6) This emulator has acquired the standards shown in "1.5 Regulatory Compliance Notices". This fact must be taken into account when the emulator is taken from Japan to some other country.
(7) Renesas Electronics Corporation will not assume responsibility of direct or indirect damage caused by an accidental failure or malfunction in the emulator.

When disposing of the emulator:

Penalties may be applicable for incorrect disposal of this waste, in accordance with your national legislation.

Usage restrictions:

The emulator has been developed as a means of supporting system development by users. Therefore, do not use it as an embedded device in other equipment. Also, do not use it to develop systems or equipment for use in the following fields.

(1) Transportation and vehicular
(2) Medical (equipment that has an involvement in human life)
(3) Aerospace
(4) Nuclear power control
(5) Undersea repeaters

If you are considering the use of the emulator for one of the above purposes, please be sure to consult your local distributor.

About product changes:

We are constantly making efforts to improve the design and performance of our product. Therefore, the specification or design of the emulator, or this user's manual, may be changed without prior notice.

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(1) We assume no responsibility for any damage or infringement on patent rights or any other rights arising from the use of any information, products or circuits presented in this user’s manual.
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About diagrams:

Some diagrams in this user’s manual may differ from the objects they represent.

Precautions for Safety

This chapter, by showing the relevant diagrammatic symbols and their meanings, describes the precautions which should be taken in order to use this product safely and properly. Be sure to read and understand this chapter before using this product.
Contact us if you have any questions about the precautions described here.

⚠WARNING WARNING indicates a potentially dangerous situation that will cause death or heavy wound unless it is avoided.

⚠CAUTION CAUTION indicates a potentially dangerous situation that will cause a slight injury or a medium-degree injury or property damage unless it is avoided.

To avoid a possible danger, the following diagrammatic symbols are used to call your attention.

△ means WARNING or CAUTION.
Example: CAUTION AGAINST AN ELECTRIC SHOCK

⃠ means PROHIBITION.
Example: DISASSEMBLY PROHIBITED

● means A FORCIBLE ACTION.
Example: UNPLUG THE POWER CABLE FROM THE RECEPTACLE.

WARNING

Warnings for AC Power Supply:

Do not repair or remodel the emulator product by yourself in order to prevent danger such as an electric shock or fire and for the sake of quality assurance. For after-sale services in case of a mechanical or electrical fault, please contact your local distributor.

Always switch off the Host machine and user system before connecting or disconnecting any cables or parts. Neglect of this precaution will result in getting an electric shock or will result in the emulator product or user system emitting smoke or catching fire. Also, the user program under debug will be destroyed.

Make sure that the connectors on both ends of the user interface cable are facing the right way relative to the user-side connector on the emulator and the connector on the user system, respectively.
Neglect of this precaution will result in getting an electric shock or will result in the emulator product or user system emitting smoke or catching fire.

Warning for Modification:

Do not modify the emulator. Personal injury due to electric shock may occur if the emulator is modified.

Warning for Installation:

Do not set the emulator in water or areas of high humidity. Make sure that the product does not get wet. Spilling water or some other liquid into the product may cause damage.

Warning for Use temperature:

The emulator is to be used in an environment with a maximum ambient temperature of 35°C.
Care should be taken that this temperature is not exceeded.

CAUTION

Cautions to Be Taken for Handling The emulator:

Use caution when handling the emulator. Be careful not to apply a mechanical shock.

Do not touch the connector pins of the emulator and the target MCU connector pins directly. Static electricity may damage the internal circuits.

When attaching and removing the cable, hold the plug of the cable and do not touch the cable. When installing the emulator, do not flex the cable excessively or pull the emulator or the board by the cable connected to it. The cable may cause a break.

Do not tape the flexible cable or apply adhesives to secure the cable. The shielding material on the surface of the cable may come off.

Caution to Be Taken for System Malfunctions:

If the emulator malfunctions because of interference like external noise, do the following to remedy the trouble.

(1) Exit the emulator debugger, and shut OFF the emulator and the user system.

(2) After a lapse of 10 seconds, turn ON the power of the emulator and the user system again, then launch the emulator debugger.

Caution to Be Taken for Disposal:

Penalties may be applicable for incorrect disposal of this waste, in accordance with your national legislation.

European Union regulatory notices:

The WEEE (Waste Electrical and Electronic Equipment) regulations put responsibilities on producers for the collection and recycling or disposal of electrical and electronic waste. Return of WEEE under these regulations is applicable in the European Union only. This equipment (including all accessories) is not intended for household use. After use the equipment cannot be disposed of as household waste, and the WEEE must be treated, recycled and disposed of in an environmentally sound manner.

Renesas Electronics Europe GmbH can take back end of life equipment, register for this service at "http://www.renesas.eu/weee"

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Terminology

Some specific words used in this user's manual are defined below.

Integrated development environment

This tool provides powerful support for the development of embedded applications for Renesas microcomputers. It has an emulator debugger function allowing the emulator to be controlled from the Host machine via an interface. Furthermore, it permits a range of operations from editing a project to building and debugging it to be performed within the same application. In addition, it supports version management.

Emulator debugger

This means a software tool that is started up from the High-performance Embedded Workshop, and controls the emulator and enables debugging.

Programming software

This means Renesas Flash Programmer that is available on the emulator.

Host machine

This means a personal computer used to control the emulator.

Target MCU

This means the MCU to be debugged.

User system

This means a user's application system in which the MCU to be debugged is used.

User program

This means the program to be debugged.

1. Outline

This chapter describes the package components, the system configuration, and the specifications of the emulator functions and operating environment.

1.1. Package Components

The E2 Lite package consists of the following items. After you have unpacked the box, check if your E2 Lite contains all of these items. Table 1.1 shows the packing components for the E2 Lite, respectively.

Table 1.1 Package components for the E2 Lite

Item	Quantity
Main E2 Lite unit (RTE0T0002LKCE00000R)	1
USB interface cable (A plug — mini-B plug, 1.0 m,)	1
User interface cable (14-pin flat cable, 15cm)	1

1.2. System Configuration

The E2 Lite is used by connecting it to the target MCU mounted on the user system.
Figure 1.1 shows the configuration of the E2 Lite system.

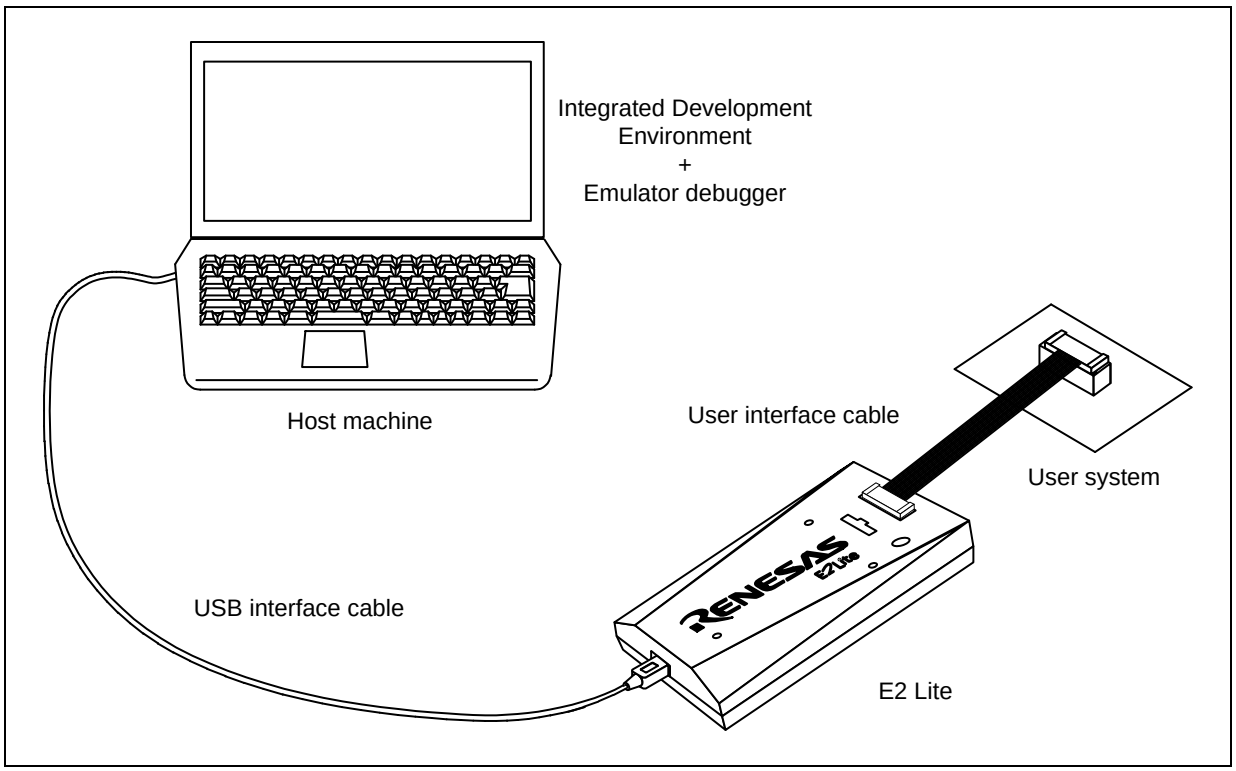


Figure 1.1 System configuration with E2 Lite

(1) E2 Lite (this product)
(2) USB interface cable (included)
(3) User interface cable (included)
(4) User system
This is your application system using the MCU to be debugged.
(5) Host machine
A personal computer to control the emulator by USB interface.

1.3. PC Interface

- USB Interface *1
  USB 2.0 full speed (also connectable to the USB 1.1 and USB 3.0 -compatible host machine)
  Note: 1 Not guaranteed to operate in any combination of a host machine, USB device, and USB hub.

1.4. Specifications

Table 1.2 lists the specifications of the E2 Lite.

Table 1.2 Specifications of the E2 Lite

Item	Description
Emulator Type	E2 Emulator Lite Type name: RTE0T0002LKCE00000R
PC Interface	USB 2.0 (full speed)
User Interface	14-pin connector 7614-6002 [Sumitomo 3M Limited] 2514-6002 [3M Limited]
Power Voltage for the emulator	USB-bus power supply (VBUS 4.5 V, min / 500 mA, min)
Power supply for the target MCU	Supplied from the user system or Supplied from the emulator (3.3V 200 mA, max *)
Correspondence user system voltage	Within 1.8 V to 5.5 V, and in the range of the MCU operating power supply voltage (For more information, see E1/E20 Emulator, E2 Emulator Lite Additional Document for User's Manual)
External dimension (main body)	96.2mm × 52.7mm × 17.2 mm
Weight	47g
Operating temperature	5 to 35°C (no condensation)
Storage temperature	-10 to 60°C (no condensation)
EMC	EU: EN 55022 Class A, EN 55024 USA: FCC part 15 Class A

Note: If you can supply 500mA from USB VBUS

1.5. Regulatory Compliance Notices

1.5.1. European Union regulatory notices

This product complies with the following EU Directives. (These directives are only valid in the European Union.)

CE Certifications:

・Electromagnetic Compatibility (EMC) Directive 2004/108/EC

EN 55022 Class A

WARNING:	This is a Class A product. This equipment can cause radio frequency noise when used in the residential area. In such cases, the user/operator of the equipment may be required to take appropriate countermeasures under his responsibility.

EN 55024

- Information for traceability
  - Authorized representative

    Name: Renesas Electronics Corporation

    Address: 1753, Shimonumabe, Nakahara-ku, Kawasaki, Kanagawa, 211-8668, Japan
  - Manufacturer

    Name: Renesas System Design Co., Ltd.

    Address: 18th Fl. Concurred Yokohama,3-1Kinko-cho Kanagawa-ku Yokohama-City Kanagawa Pref., 221-0056, Japan
  - Person responsible for placing on the market

    Name: Renesas Electronics Europe Limited

    Address: Dukes Meadow, Millboard Road, Bourne End, Buckinghamshire, SL8 5FH, U.K.
  - Trademark and Type name

    Trademark: Renesas

    Product name: E2 Lite

    Type name: RTE0T0002LKCE00000R

Environmental Compliance and Certifications:

- Waste Electrical and Electronic Equipment (WEEE) Directive 2012/19/EU

1.5.2. United States Regulatory notices

This product complies with the following EMC regulation. (This is only valid in the United States.)

FCC Certifications:

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

CAUTION:	Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

1.6. Emulator Hardware Configuration

As shown in Figure 1.2, the E2 Lite consists of the E2 Lite main unit, a USB interface cable, and a user interface cable. The emulator is connectable to the host machine via a USB port compliant with USB 2.0 (Full-Speed) or USB 1.1.

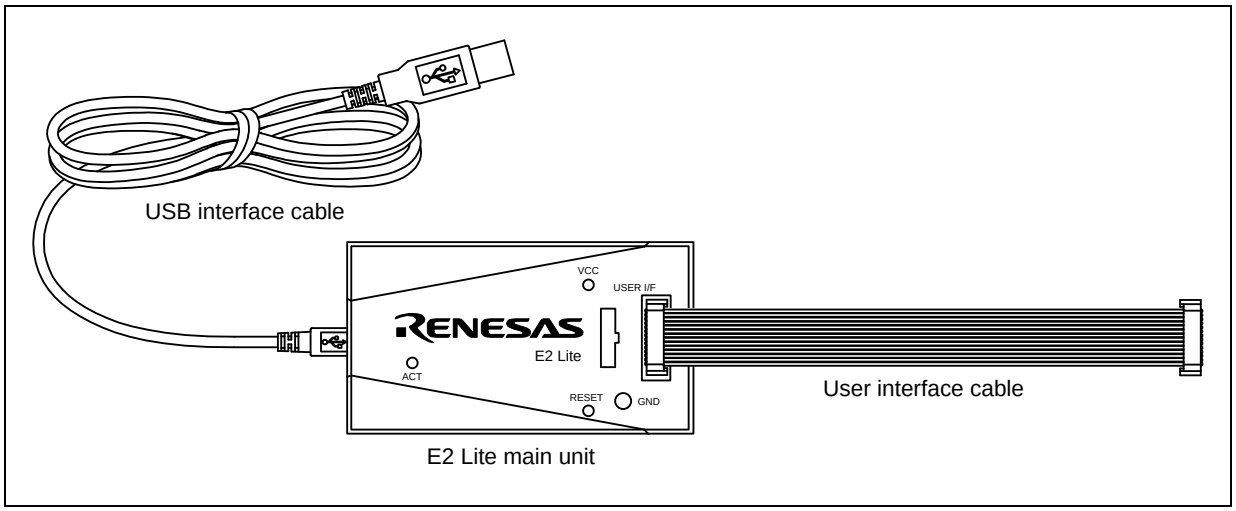
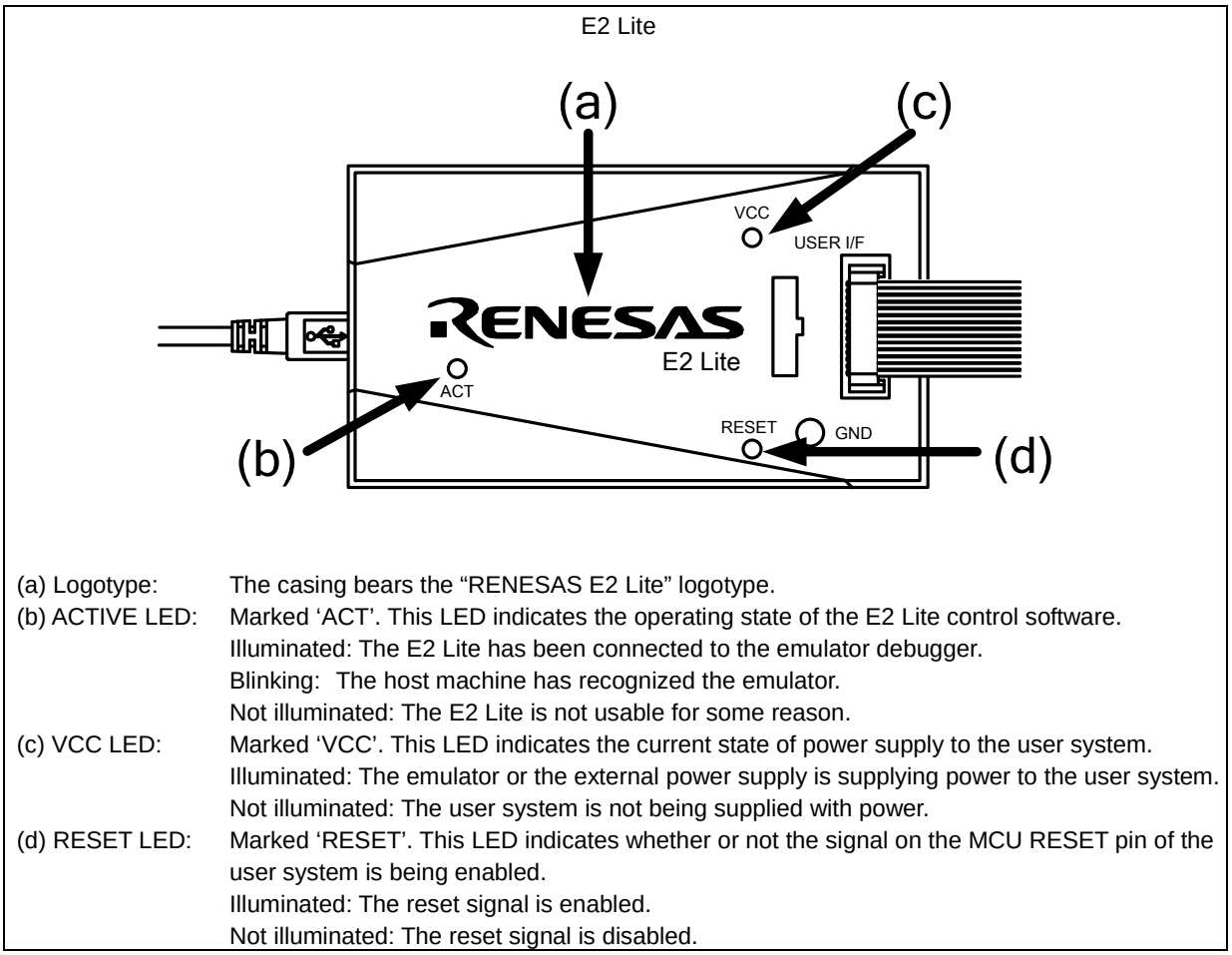


Figure 1.2 E2 Lite Hardware Configuration

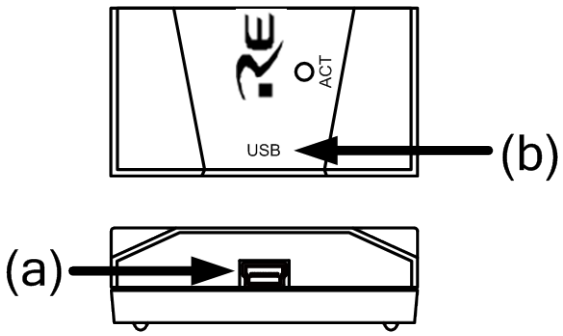
1.7. The Names of the Emulator Parts

The names of the emulator parts are given in Figure 1.3 to Figure 1.5.



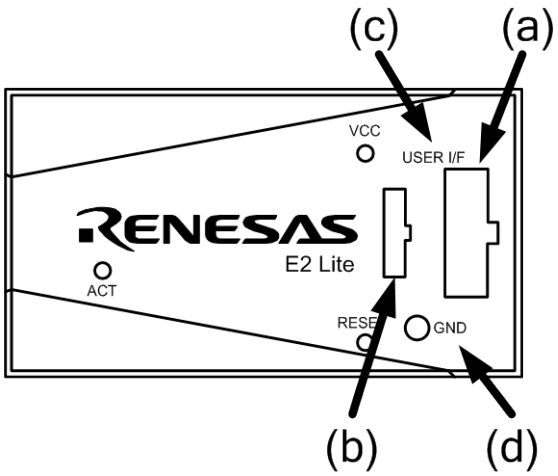
(a) Logotype:	The casing bears the “RENESAS E2 Lite” logotype.
(b) ACTIVE LED:	Marked ‘ACT’. This LED indicates the operating state of the E2 Lite control software. Illuminated: The E2 Lite has been connected to the emulator debugger. Blinking: The host machine has recognized the emulator. Not illuminated: The E2 Lite is not usable for some reason.
(c) VCC LED:	Marked ‘VCC’. This LED indicates the current state of power supply to the user system. Illuminated: The emulator or the external power supply is supplying power to the user system. Not illuminated: The user system is not being supplied with power.
(d) RESET LED:	Marked ‘RESET’. This LED indicates whether or not the signal on the MCU RESET pin of the user system is being enabled. Illuminated: The reset signal is enabled. Not illuminated: The reset signal is disabled.

Figure 1.3 E2 Lite Top View



(a) Host-side connector:	A USB connector for the host machine. Be sure to connect the provided USB interface cable.
(b) Host-side connector mark:	Marked “USB”. A connector for the host machine is provided at the side of this mark.

Figure 1.4 E2 Lite Host-Side View



(a) User-side connector:	A user interface cable (14pin) is connected.
(b) Expansion connector:	Cannot be used.
(c) User-side connector mark:	Marked ‘USER I/F’. A connector for the user interface cable is provided at the side of this mark.
(d) GND:	Cannot be used.

Figure 1.5 E2 Lite User-Side View

1.8. Operating Environment

Observe the conditions listed in Table 1.3when using the emulator.

Table 1.3 Operating environmental conditions

Item	Description
Temperature	Operating: +5°C to +35°C Storage: –10°C to +60°C
Humidity	35% RH to 80% RH, no condensation
Vibration	Operating: 2.45 m/s2 max. Storage: 4.9 m/s2 max. Transportation: 14.7 m/s2 max.
Ambient gases	No corrosive gases may be present

2. Setup

2.1. Installing Emulator Software

Before using the E2 Lite, download the latest Integrated Development Environment or Flash Programming software from the URL below and install it.

http://www.renesas.com/e2lite_download

2.2. Connecting the Emulator to the Host Machine

Use the USB interface cable to connect the E2 Lite to the host machine as shown in System Configuration when Connecting the E2 Lite to the Host Machine

For the position of each connector of the E2 Lite, refer to section 1.7, The Names of the Emulator Parts.

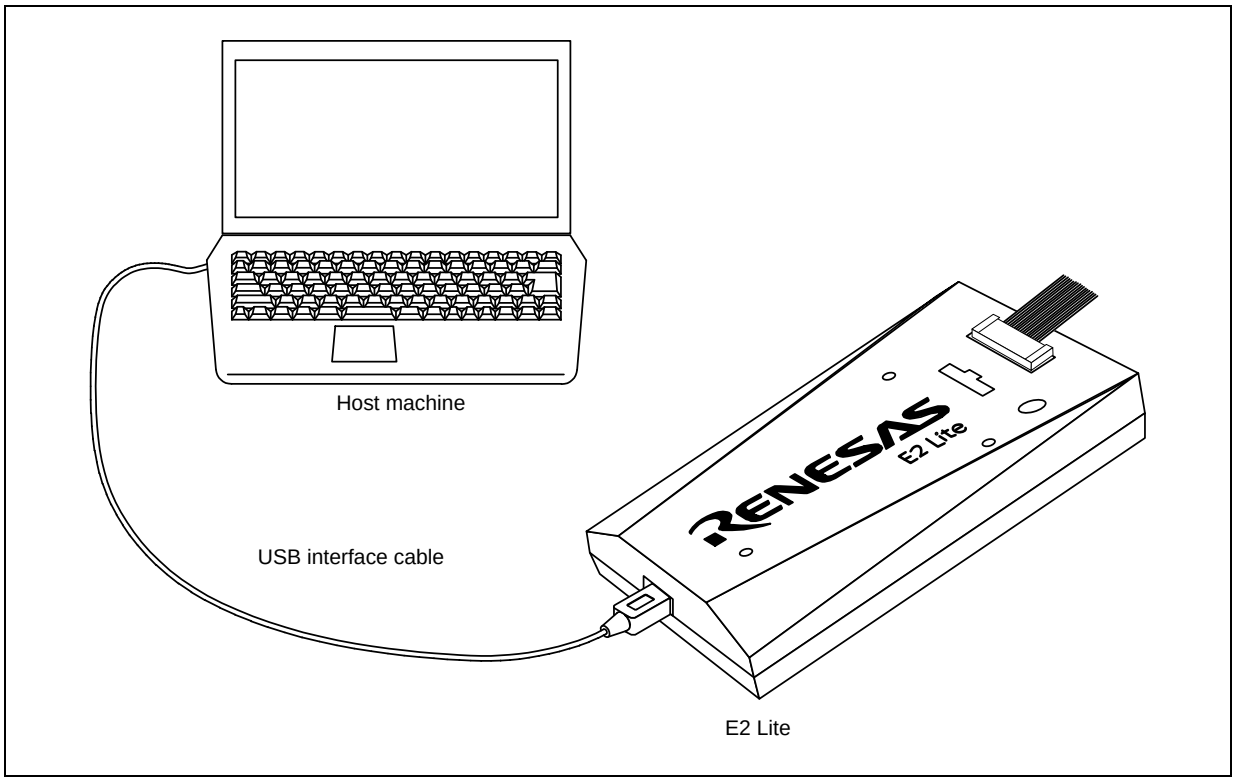


Figure 2.1 System Configuration when Connecting the E2 Lite to the Host Machine

(1) Connect the A plug of the USB interface cable to the USB I/F connector of the host machine.
(2) Connect the mini-B plug of the USB interface cable to the USB I/F connector of the E2 Lite.

When you use the E2 Lite, be sure to use the USB interface cable supplied with it.
The E2 Lite is turned on by connecting the USB interface cable.
Do not connect the E2 Lite to your host machine before installing an IDE or Flash Programming software. The USB driver is automatically installed. If the USB port of the host machine or the emulator to be connected is changed, the USB driver is re-installed.

2.3. Connecting the E2 Lite to the User System

Use the procedure below to connect the E2 Lite to the user system with the user interface cable, or to disconnect them when moving the E2 Lite or the user system.

(1) Connect the user interface cable to the user-side connector of the E2 Lite.
When connecting the user interface cable to the E2 Lite, check the position of the erroneous insertion prevention key to ensure that the cable is plugged in correctly.

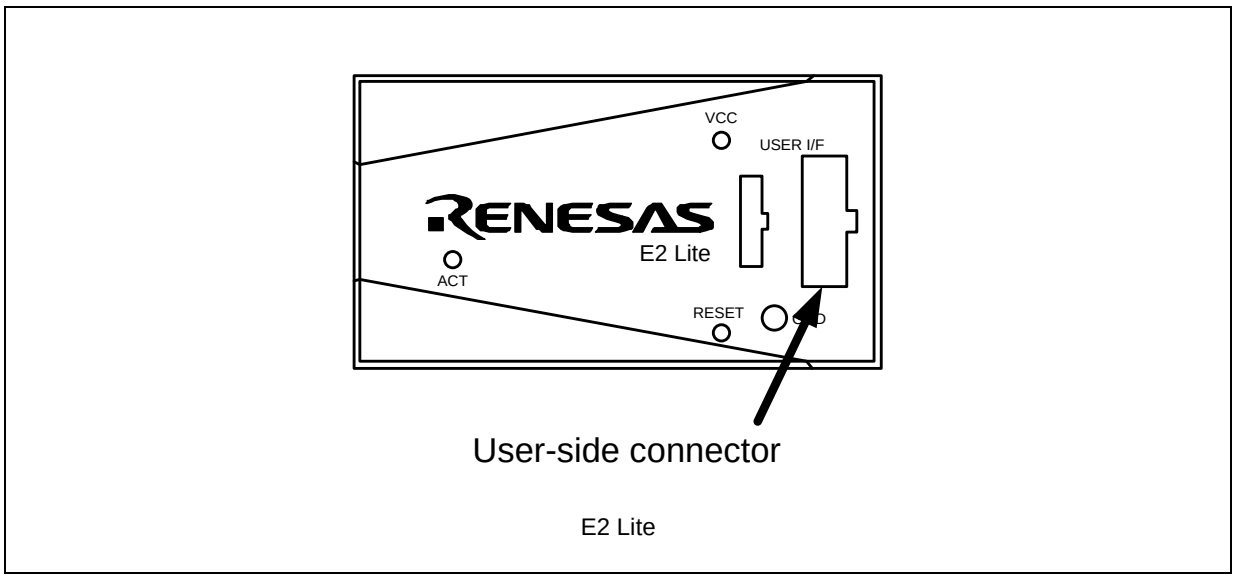


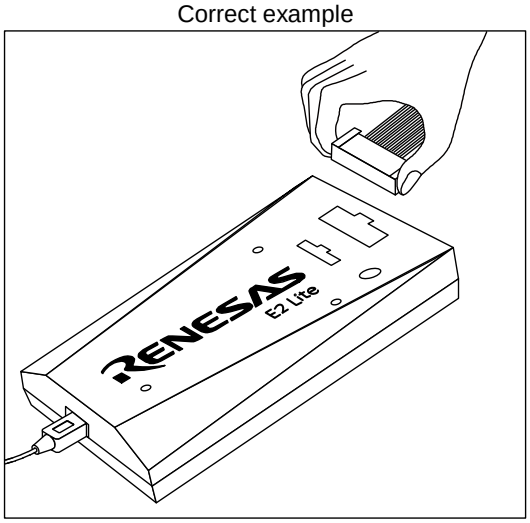
Figure 2.2 User-Side Connector on the E2 Lite

CAUTION

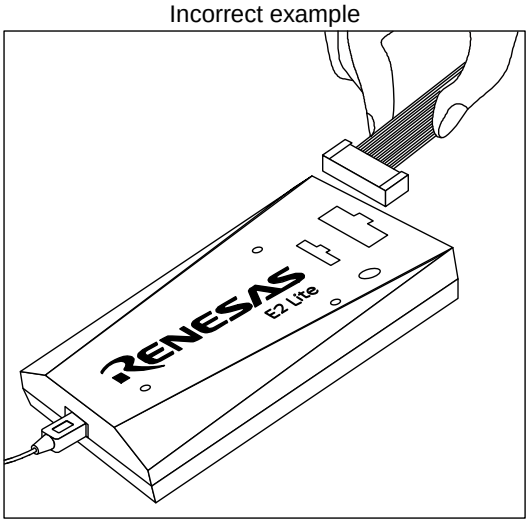
Notes on connector insertion and removal:

When connecting or disconnecting the user interface cable and the emulator or user system, grasp the connector at the end of the cable. Pulling the cable itself will damage the wiring.
Also, be aware that the user interface cable has the direction in which it must be inserted. If the cable is connected in the wrong direction, it may break down.

Correct example



Incorrect example



(2) A connector to the user interface cable must be installed on the user system. Table 2.1 shows the recommended connector for the emulator.

Table 2.1 Recommended Connector

Connector	Type Number	Manufacturer	Specifications
14-pin connector	7614-6002	Sumitomo 3M Limited	14-pin straight type (Japan)
	2514-6002	3M Limited	14-pin straight type (other countries)

(3) For the pin assignments of the connector, refer to the E1/E20 Emulator, E2 Emulator Lite Additional Document for the User's Manual.

(4) Connect one end of the user interface cable to the E2 Lite and the other end to the connector on the user system as shown in Figure 2.3.

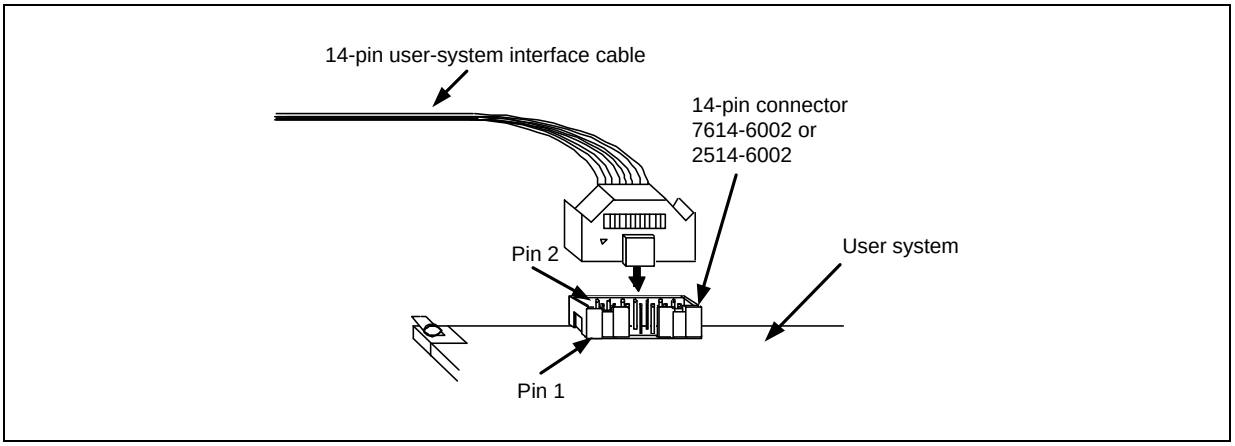


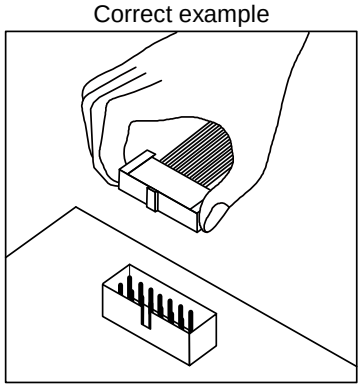
Figure 2.3 Connecting the User Interface Cable to the User System when the 14-Pin Connector is in Use with the E2 Lite

CAUTION

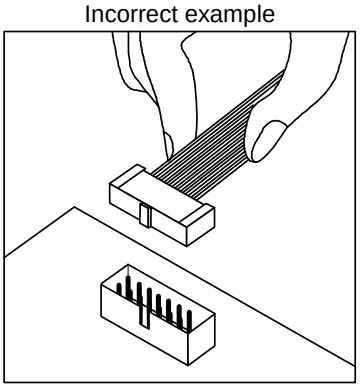
Notes on connector insertion and removal:

When connecting or disconnecting the user interface cable and the emulator or user system, grasp the connector at the end of the cable. Pulling the cable itself will damage the wiring.
Also, be aware that the user interface cable has the direction in which it must be inserted. If the cable is connected in the wrong direction, it may break down.

Correct example



Incorrect example



2.4. Turning the Power On/Off

Turn the power of the E2 Lite and the user system following the procedure below.

2.4.1. When a Separate Power Supply is Used for the User System

<When using the emulator>

(1) Check the power is off.
Check that the user system is turned off.

(2) Connect the user system.
Follow "2.3 Connecting the E2 Lite to the User System", connect the emulator and the user system with a user interface cable.

(3) Connect the host machine and turn on the emulator.
Follow "2.2 Connecting the Emulator to the Host Machine", connect the emulator and the host machine with a USB interface cable. The E2 Lite is turned on by connecting the USB interface cable.

(4) Launch the emulator debugger or programming software.
Launch the emulator debugger or programming software.

(5) Turn on the user system
Turn on the user system.

(6) Connect the emulator debugger or programming software to the E2 Lite.
Connections may vary depending on software.

<When finished using the emulator>

(1) Disconnect the emulator debugger or programming software from the E2 Lite.
Disconnections may vary depending on software.

(2) Turn off the user system.
Turn off the user system.

(3) Close the emulator debugger or programming software.
Close the emulator debugger or programming software.

(4) Turn off the emulator and disconnect the emulator.
Disconnect the USB interface cable from the emulator. The E2 Lite is turned off by disconnecting from the USB interface cable.

(5) Disconnecting the user system
Disconnect the user interface cable from the user system.

CAUTION

Note on the User System Power Supply :

While the power of the user system is on, do not turn off the host machine, unplug the USB interface cable. The user system may be damaged due to leakages current.

2.4.2. When Power is supplied to the User System from the Emulator

<When using the emulator>

(1) Connect the user system.
Follow "2.3. Connecting the E2 Lite to the User System", connect the emulator and the user system with a user interface cable.

(2) Connect the host machine and turn on the emulator.
Follow "2.2. Connecting the Emulator to the Host Machine", connect the emulator and the host machine with a USB interface cable, then turn on the emulator.

(3) Launch the emulator debugger or programming software.
Launch the emulator debugger or programming software, and select the setting of power supply to the user system.
Launch the emulator debugger and select the setting of power supply to the user system.

(4) Connect the emulator debugger or programming software to the E2 Lite.
Connections may vary depending on software.

<When finished using the emulator>

(1) Disconnect the emulator debugger or programming software from the E2 Lite.
Disconnections may vary depending on software.

(2) Close the emulator debugger or programming software.
Close the emulator debugger or programming software.

(3) Turn off the emulator and disconnect the emulator.
Disconnect the USB interface cable from the emulator, then turn off the emulator.

(4) Disconnecting the user system
Disconnect the user interface cable from the user system.

2.5. Connecting System Ground

The emulator's signal ground is connected to the user system's signal ground.
In the emulator, the signal ground and frame ground are connected.
In the user system, connect the frame ground only; do not connect the signal ground to the frame ground (Figure 2.4).
If it is difficult to separate the frame ground from the signal ground in the user system, set the GND for DC power input (AC adapter) of the host machine and the frame ground of the user system as the same potential. If the GND potential is different between the host machine and the user system, an overcurrent will flow in the low-impedance GND line and thin lines might be burned.

WARNING

Connecting System Ground :

Separate the frame ground from the signal ground at the user system. Failure to do so will result in smoke, fire, or an electric shock due to the difference in ground potential.

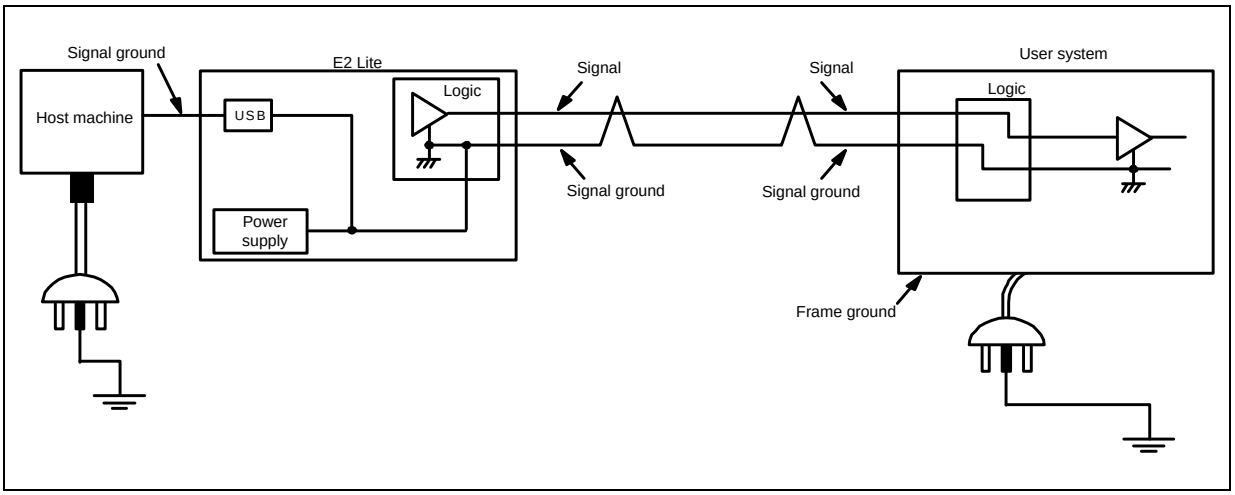


Figure 2.4 Connecting System Ground

For a debugging environment where there is a GND gap between the user system and host PC, use the isolator for the E1 emulator (R0E000010ACB10 / R0E000010ACB20) that are separately available from Renesas.

2.6. Hot-Plug-in Function

By using the optional hot-plug adapter for E1 emulators (R0E000010ACB00) which is separately sold, the hot-plug-in function of the E2 Lite which connects to the user system is available even while the user system is supplied the power and operated. For information on the hot plug-in-function, please be sure to read the latest version of a user's manual provided for each MCU group.

3. Troubleshooting (Action in Case of an Error)

3.1. How to Solve a Trouble

The following describes how to solve a trouble when any problem occurs before the emulator debugger starts after the emulator and the user system have been powered on. For the latest information on the emulator and emulator debugger, visit Renesas Electronics' development environment website (http://www.renesas.com/tools).

3.1.1. ACTION LED does not light

(1) Remains off
This means that the E2 Lite is in an unusable state for some reason. Check the following:
• Whether the E2 Lite and the host machine are connected with the USB interface cable.
• Whether the power for the host machine is turned on.

3.1.2. Unconnectable with the debugger

(1) Check the connection between the emulator and the MCU.
For details, consult the separate E1/E20 Emulator, E2 Emulator Lite manual for the MCU you're using.
• Whether the emulator and the MCU are connected correctly.
• Whether the connected signal lines are pulled up to the power supply or down to GND properly.

(2) Check to see that the MCU is in a ready state.
• The MCU operating clock is on (= oscillating).
• The MCU is supplied with power properly.
• The MCU has been reset and is ready to go.

3.2. How to Request Support

After checking the items in "Troubleshooting", contact us from the following URL.

http://www.renesas.com/contact/

For prompt response, please specify the following information:
(1) Operating environment
MCU name: _____
Operating frequency: _____ [MHz]
MCU operating mode: _____ [Mode]
(2) Condition
The emulator debugger starts up / does not start up
Frequency of errors: always / frequency ( )
(3) Problem

4. Maintenance and Warranty

This chapter covers basic maintenance, warranty information, provisions for repair and the procedures for requesting a repair.

4.1. Maintenance

(1) If dust or dirt collects on this product, wipe it off with a dry soft cloth. Do not use thinner or other solvents because these chemicals can cause the surface coating to separate.
(2) When you do not use this product for a long period, disconnect it from the power supply, host machine and user system.

4.2. Warranty

(1) Our repair service is not available for this product. We cannot accept any request for repair.
(2) In the case of replacement due to initial failure, please contact your local distributor within 30 days after the arrival.

⚠CAUTION

Note on Transporting the Product:

When sending your product, use the packing box and cushioning material supplied with the product when it was delivered to you and specify caution in handling (handling as precision equipment). If packing of your product is not complete, it may be damaged during transportation.

E2 Emulator Lite RTE0T0002LKCE00000R
User's Manual

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Refer to "http://www.renesas.com/" for the latest and detailed information.

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User’s Manual

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